

## Quadratics Continued

$$f(x) = x^2 - 5x - 6$$

$$f(x) = \left(x - \frac{5}{2}\right)^2 - 6 - \frac{25}{4}$$

$$f(x) = \left(x - \frac{5}{2}\right)^2 - \frac{49}{4}$$

The graph of this function is obtained by translating the graph of  $g(x) = x^2$  by  $\begin{pmatrix} \frac{5}{2} \\ -\frac{49}{4} \end{pmatrix}$

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Ex 2  $f(x) = x^2 - 2x - 3$

$$f(x) = (x-1)^2 - 3 - 1$$

$$= (x-1)^2 - 4$$

Translation of  $g(x) = x^2$  by  $\begin{pmatrix} 1 \\ -4 \end{pmatrix}$

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### Factorising to solve Quadratic Equns

Exercise 2A

1d  $5x^2 = 30x$

$$5x^2 - 30x = 0$$

$$5x(x-6) = 0$$

$$\text{Entweder } \underline{x=0} \text{ or } \underline{x-6=0}$$

$$3a) \quad 3x^2 + 5x = 2$$

$$3x^2 + 5x - 2 = 0$$

$$\begin{array}{l} 3x-2 \\ = -6 \\ -1+6 \end{array}$$

$$3x^2 - x + 6x - 2 = 0$$

$$x(3x-1) + 2(3x-1) = 0$$

$$(x+2)(3x-1) = 0$$

$$\text{Entweder } x+2=0 \quad \text{or} \quad 3x-1=0$$

$$x = -2$$

$$3x = 1$$

$$x = \frac{1}{3}$$

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$$3f) \quad (x-3)^2 = 13$$

$$x-3 = \pm\sqrt{13}$$

$$x = +\sqrt{13} + 3$$

$$x = +\sqrt{13} - 3$$

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$$3h) \quad 5x^2 - 10x^2 = -7 + x + x^2$$

$$0 = 6x^2 + x - 7$$

$$0 = (6x+7)(x-1)$$

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$$6x + 7 = 0$$

$$6x = -7$$

$$\underline{x = -\frac{7}{6}}$$

or

$$x - 1 = 0$$

$$\underline{x = 1}$$

## Exercise 2B

1 f

$$4x^2 - 4x - 1 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{+4 \pm \sqrt{(-4)^2 - 4(4)(-1)}}{8}$$

$$x = \frac{+4 \pm \sqrt{16 + 16}}{8}$$

$$x = \frac{+4 \pm \sqrt{32}}{8}$$

$$x = \frac{+4 \pm \sqrt{16 \times 2}}{8}$$

$$x = \frac{+4 \pm 4\sqrt{2}}{8}$$

$$x = \frac{4(1 \pm \sqrt{2})}{8}$$

$$x = \frac{1 \pm \sqrt{2}}{2}$$

2 g

$$3x^2 + 8 = 16x$$

$$3x^2 - 16x + 8 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{+16 \pm \sqrt{(-16)^2 - 4(3)(8)}}{6}$$

$$x = \frac{16 \pm \sqrt{256 - 96}}{6}$$

$$x = \frac{16 \pm \sqrt{160}}{6}$$

$$x = 4.77 \quad \text{or} \quad x = 0.558$$

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## Quadratics in Other Functions

Ex 1

$$\sin^2 x - \sin x - 2 = 0$$

Let  $y = \sin x$

$$y^2 - y - 2 = 0$$

$$(y - 2)(y + 1) = 0$$

$$y = 2 \quad \text{or} \quad y = -1$$

$$\Rightarrow \sin x = 2 \quad \text{or} \quad \sin x = -1$$

$$x = \sin^{-1}(-1)$$

for  $0 \leq x < 360^\circ$

$$\underline{x = 270^\circ}$$

